

REMARKS

This amendment is filed in response to the Office Action dated June 1, 2006. In view of this amendment, this application should be allowed and the case passed to issue.

No new matter is introduced by this amendment. The amendment to claims 1 and 7 are supported by the specification at paragraphs [32] and [33]. The amendment to claims 14 and 15 correct an informality. The specification is amended to correct an informality.

Claims 1-17 are pending in this application. Claims 1-17 are rejected. Claims 1, 14, 15, and 17 have been amended in this response.

Specification

The specification is objected to because page 8, lines 29 and 30 are missing respective figure reference numbers. This objection is traversed, and reconsideration and withdrawal thereof respectfully requested. The specification has been amended to include the figure reference numbers.

Claim Rejections Under 35 U.S.C. § 112

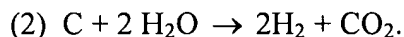
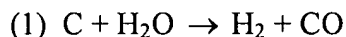
Claim 14 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite because the limitation "estimating the predetermined amount of soot on the filter" is allegedly confusing. This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

It is believed that claim 14 is definite to one of ordinary skill in this art. However, in order to advance the prosecution in this application, claim 14 has been amended to overcome the asserted informality. Claim 15 has also been amended in a similar manner.

Claim Rejections Under 35 U.S.C. § 103

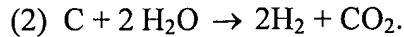
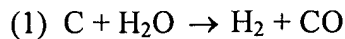
Claims 1-3 and 9-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Seaba et al. (U.S. Pat. Pub. No. 2004/0079031) in view of Kupe et al. (U.S. Pat. Pub. No. 2004/0098977). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the invention, as claimed, and the cited prior art.

An aspect of the invention, per claim 1, is a fuel processing system for reforming a hydrocarbon fuel characterized by a first vaporization zone for receiving a hydrocarbon fuel and combining it with air or water. A reformer in fluid connection with and down stream of the first vaporization zone receives the hydrocarbon fuel combined with either air or water to reform the fuel to a reformat stream, which contains a hydrogen rich atmosphere. A second vaporization zone in fluid connection with the reformer is capable of receiving the reformat stream from the reformer. A water inlet connected to the second vaporization zone is capable of introducing water to the reformat stream. A filter in fluid connection with and down stream of the second vaporization zone is capable of preventing a substantial portion of any soot contained in the reformat stream from passing therethrough. The system is adapted to oxidize any soot collected on the filter in the hydrogen atmosphere of the reformat stream by reactions of the following formulas (1) and/or (2):



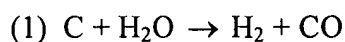
Another aspect of the invention, per claim 10, is a process for removing soot in a reformat stream that has been collected on a filter. The process comprises combining a hydrocarbon fuel with air to form a hydrocarbon fuel-air mixture. The mixture is reformed to a reformat stream, which contains a hydrogen rich atmosphere. The reformat stream is passed

through a filter to collect any soot in the reformat stream on the filter. When a predetermined amount of soot has collected on the filter, at least water is introduced to the reformat stream for a set period of time during the reforming of the hydrocarbon fuel in sufficient quantity to oxidize the soot collected on the filter by reactions of the following formulas (1) and/or (2):

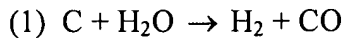


The Examiner asserted that Seaba et al. teach a fuel reforming system/apparatus and method (Fig. 1) comprising a first vaporization zone (22), reformer (34), and second vaporization zone (38). The Examiner acknowledged that Seaba et al. fail to show a filter in fluid connection with and downstream of the second vaporization zone which is capable of preventing a substantial portion of any soot contained in the reformat stream from passing therethrough, and wherein the system is adapted to oxidize any soot collected on the filter in the hydrogen atmosphere of the reformat stream. The Examiner averred that Kupe et al. teach an apparatus for regenerating a particulates filter comprising a reformer and a soot/particulates filter downstream of a vaporization zone/heat exchanger. The Examiner maintained that it would have been obvious to include a soot filter downstream of the second vaporization zone of the Seaba et al. apparatus to trap soot and prevent it from exiting the tailpipe.

The combination of Seaba et al. and Kupe et al. do not suggest the claimed fuel processing system and process for removing soot in a reformat stream. Neither reference suggests that the system is adapted to oxidize any soot collected on the filter in the hydrogen atmosphere of the reformat stream by reactions of the following formulas (1) and/or (2):



(2) $C + 2 H_2O \rightarrow 2H_2 + CO_2$, as required by claim 1; or that when a predetermined amount of soot has collected on the filter, at least water is introduced to the reformat stream for a set period of time during the reforming of the hydrocarbon fuel in sufficient quantity to oxidize the soot collected on the filter by reactions of the following formulas (1) and/or (2):

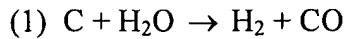


In the present invention, water is introduced to the reformat stream to oxidize soot collected on the filter by the reactions of formulas (1) and/or (2). Whereas, in Seaba et al. water is added to syn-gas at the heat exchanger (38) to cool the syn-gas to approximately 450 °C (*see* paragraph [0026]), not to cause an exothermic reaction, such as the oxidation of soot collected on a filter, as required by the present invention.

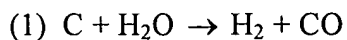
In Kupe et al., hydrogen gas generated in a reformer (16) is introduced to the engine exhaust to be combusted over an oxidation catalyst (34). Heat generated by the combustion of hydrogen gas is used to initiate combustion of trapped particles in a particulate filter (36) which is coupled to the oxidation catalyst (34) (*see* paragraph [0043]). Kupe et al. do not disclose using water to oxidize soot on a filter, as required by the present invention.

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). There is no suggestion in Seaba et al. or Kupe et al. to modify the fuel processing system of Seaba et al. or

the process for removing particles of Kupe et al. to provide a fuel processing system adapted to oxidize any soot collected on the filter in the hydrogen atmosphere of the reformat stream by reactions of the following formulas (1) and/or (2):



(2) $\text{C} + 2 \text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{CO}_2$, as required by claim 1, or to provide a process wherein, when a predetermined amount of soot has collected on the filter, at least water is introduced to the reformat stream for a set period of time during the reforming of the hydrocarbon fuel in sufficient quantity to oxidize the soot collected on the filter by reactions of the following formulas (1) and/or (2):

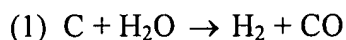


The only teaching of the claimed fuel processing system and process for removing soot in a reformat stream is found in Applicant's disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

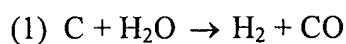
Claims 4-8 and 15-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Seaba et al. in view of Kupe et al. and further in view of Smaling (U.S. Pat. Pub. No. 2003/0200742). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Seaba et al., Kupe et al., and Smaling does not suggest the claimed fuel processing system and process for removing soot in a reformat stream because Smaling does not cure the deficiencies of Seaba et al. or Kupe et al. Smaling does not suggest that the system

is adapted to oxidize any soot collected on the filter in the hydrogen atmosphere of the reformat stream by reactions of the following formulas (1) and/or (2):



(2) $\text{C} + 2 \text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{CO}_2$, as required by claim 1; or that when a predetermined amount of soot has collected on the filter, at least water is introduced to the reformat stream for a set period of time during the reforming of the hydrocarbon fuel in sufficient quantity to oxidize the soot collected on the filter by reactions of the following formulas (1) and/or (2):



(2) $\text{C} + 2 \text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{CO}_2$, as required by claim 10. Thus, claims 4-8 and 15-17 are allowable for at least the same reasons as claims 1 and 10, respectively.

The dependent claims are allowable for at least the same reasons as the independent claims from which they depend and further distinguish the claimed system and process.

In view of the above remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

Application No.: 10/714,855

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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